

Instruments page

Goal

Deliver handheld, rapid-response technologies for small biomolecule monitoring/identification to provide state-of-the-art detection instruments for Constellation and future NASA mission requirements

In order to meet their technology development goal, the LOCAD team and its collaborators are currently designing, fabricating, and testing technologies for near- or far-term use.

LOCAD Instruments:



• **LOCAD-Portable Test System (PTS):**

- Near-term technology
- Utilizes a colorimetric change in the sample to determine the concentration of small biological molecules associated with microbes
- Currently operating on the ISS
 - Rapid = <15 minute analysis time
- Handheld, *in situ* analysis
- Approved as a method to measure the contamination of outbound spacecraft for Planetary Protection
- Provides information on the overall levels of microbial contamination from live, dead, and difficult to culture organisms
- Supplies information on molecules of interest to astrobiology while also serving as a sample contamination monitor



• **Extended PTS:**

- Mid-term technology
- Based on a modified PTS platform outfitted with enhanced optics specifically designed for visualizing a microarray
- Molecules in the array can be customized for distinct customers' analysis needs
- Handheld, *in situ*, rapid (<1 hr) analysis
- Provides more detailed information than the LOCAD-PTS regarding the particular microbial organisms found on a surface or in a liquid sample
- Identifies a greater number of microbial and chemical molecules (5-30) simultaneously than the LOCAD-PTS
- Supplies data that would advance the sensitivity and state-of-the-art for NASA *in situ* detection instrumentation



• **Integrated Microfluidic-Microarray Monitor (IM3):**

- Far-term technology
- Integrates microfluidic and microarray technologies in order to automate and standardize sample preparation and analysis
- Species-specific identification of various microbes or biomarkers of interest to crew health, environmental monitoring, or planetary protection

- Array targets can be customized for distinct customers' needs
- Increased number of compounds analyzed simultaneously over all previous technologies (>300)
- Handheld, *in situ*, rapid (<2 hr) analysis
- Can specifically identify and quantify various microorganisms from simple or complex samples
- Can be used as a multi-purpose instrument for assessing crew health, cleanliness of an environment, forward contamination, and detecting life on other planets

For more information on operational procedures, specifications, and requirements for each technology, please see either [Instruments](#) or [Specifications and Requirements](#) (hotlinks).